FIG. 1

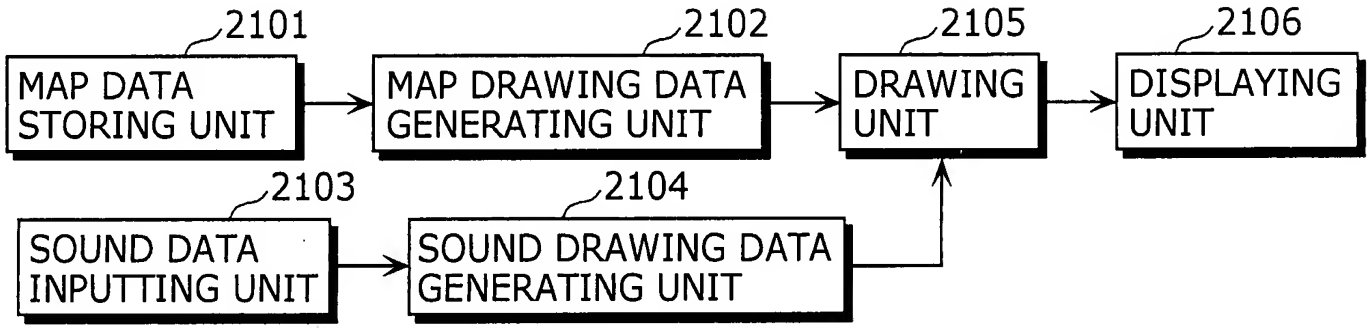

2101
MAP DATA STORING UNIT
2102
MAP DRAWING DATA GENERATING UNIT
2105
DRAWING UNIT
2106
DISPLAYING UNIT
2103
SOUND DATA INPUTTING UNIT
2104
SOUND DRAWING DATA GENERATING UNIT

FIG. 2

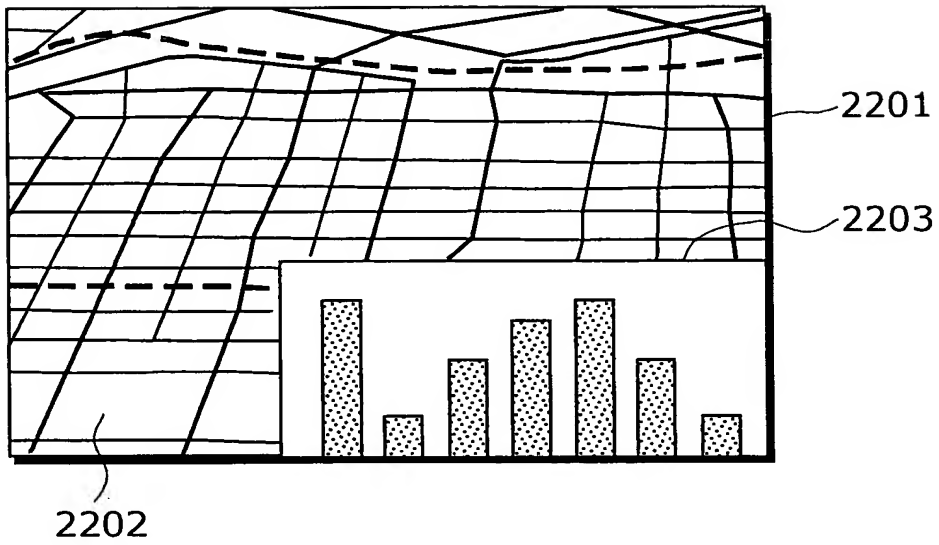


FIG. 3

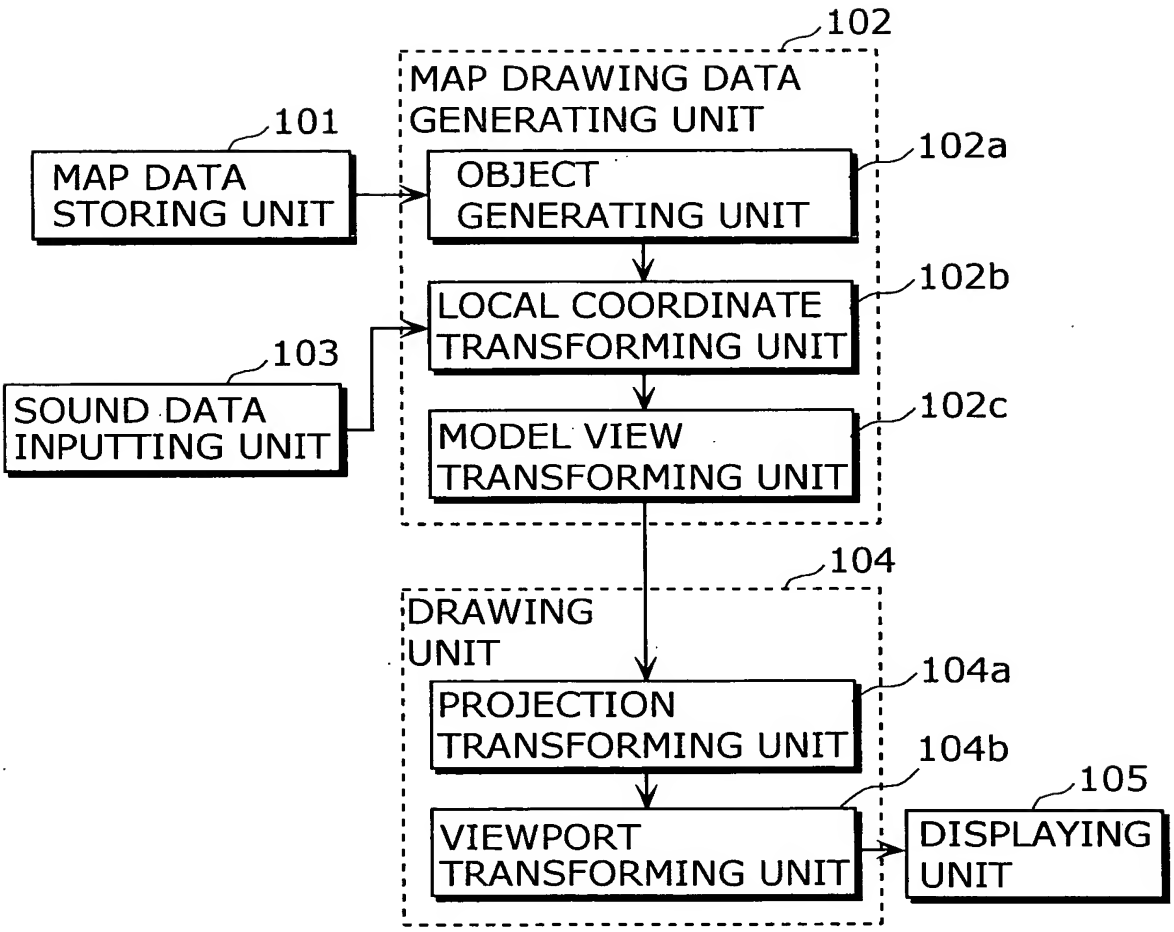

102
MAP DRAWING DATA GENERATING UNIT
101
MAP DATA STORING UNIT
OBJECT GENERATING UNIT
102a
LOCAL COORDINATE TRANSFORMING UNIT
102b
103
SOUND DATA INPUTTING UNIT
MODEL VIEW TRANSFORMING UNIT
102c
104
DRAWING UNIT
PROJECTION TRANSFORMING UNIT
104a
104b
105
VIEWPORT TRANSFORMING UNIT
DISPLAYING UNIT

FIG. 4

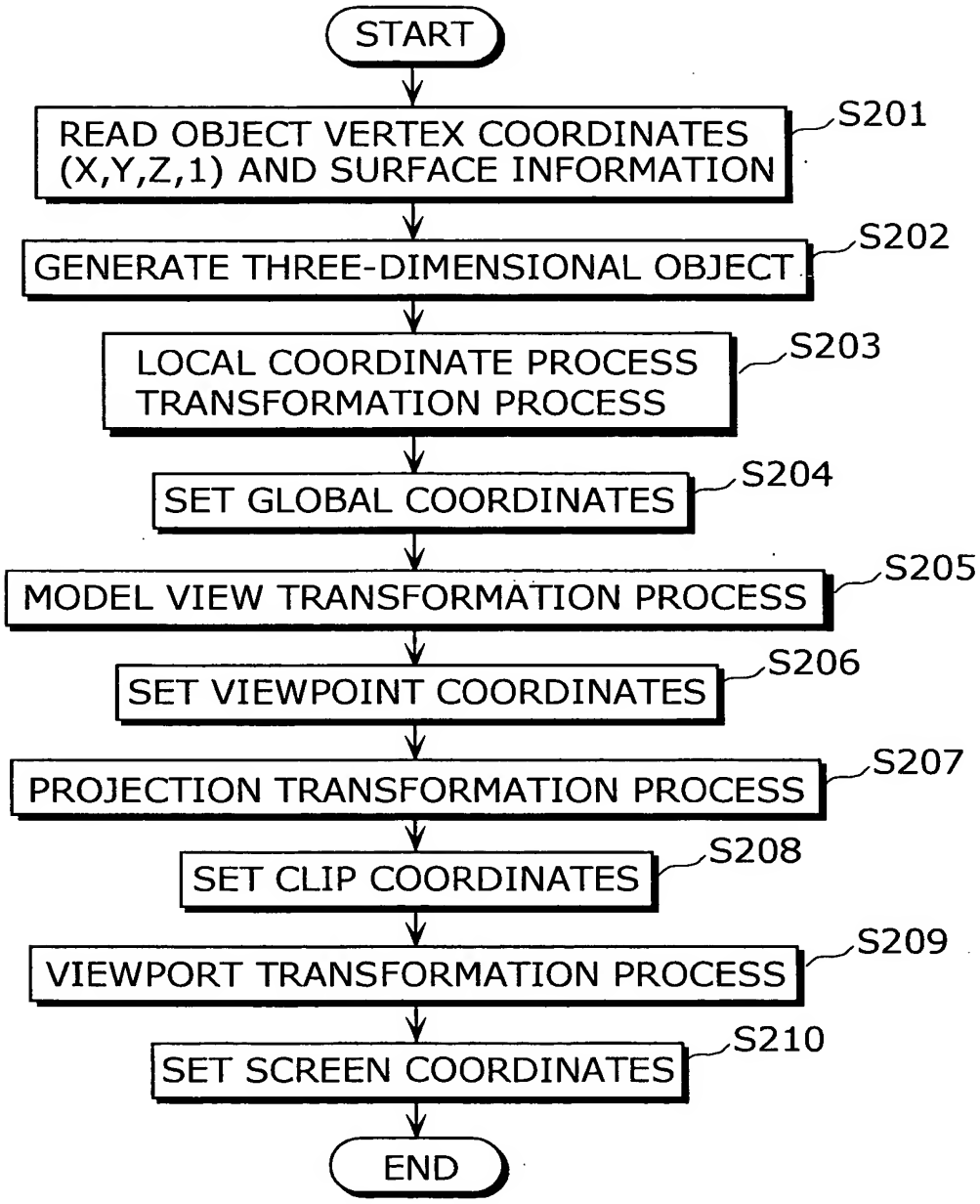

START
READ OBJECT VERTEX COORDINATES (X,Y,Z,1) AND SURFACE INFORMATION
S201
GENERATE THREE-DIMENSIONAL OBJECT
S202
LOCAL COORDINATE PROCESS TRANSFORMATION PROCESS
S203
SET GLOBAL COORDINATES
S204
MODEL VIEW TRANSFORMATION PROCESS
S205
SET VIEWPOINT COORDINATES
S206
PROJECTION TRANSFORMATION PROCESS
S207
SET CLIP COORDINATES
S208
VIEWPORT TRANSFORMATION PROCESS
S209
SET SCREEN COORDINATES
S210
END

FIG. 5

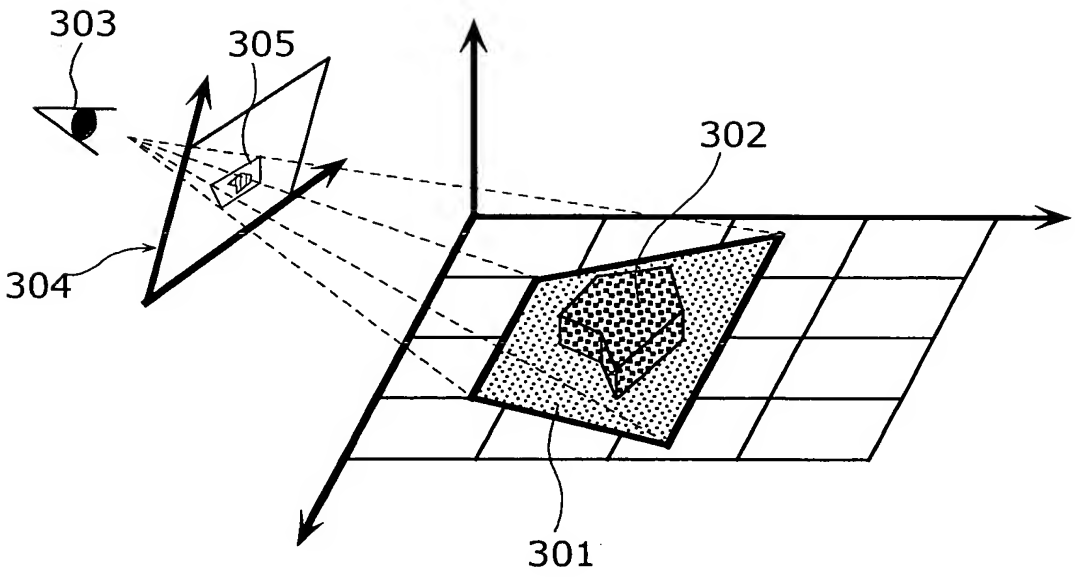


FIG. 6

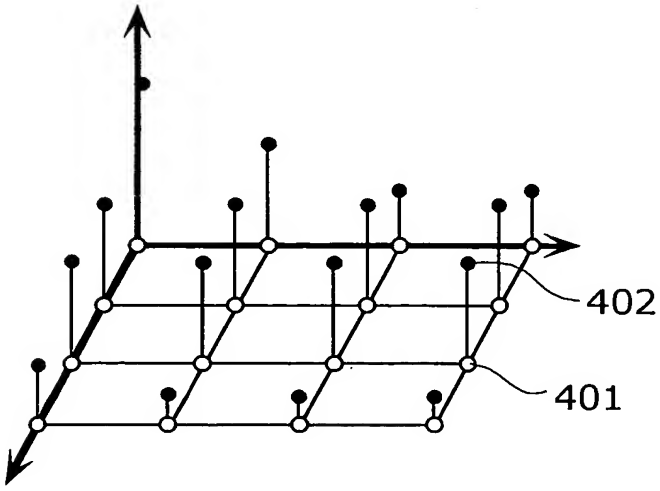


FIG. 7

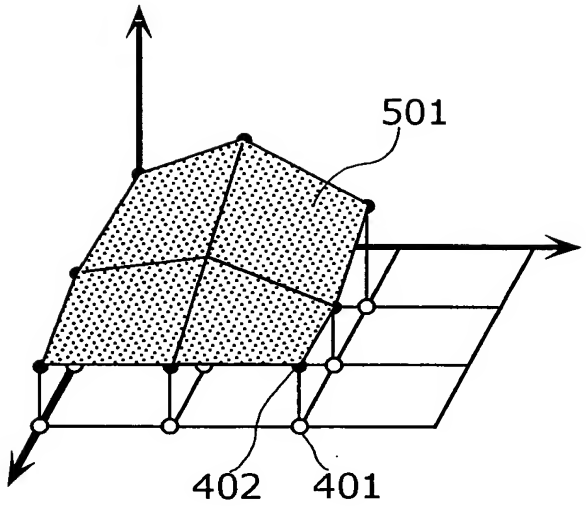


FIG. 8

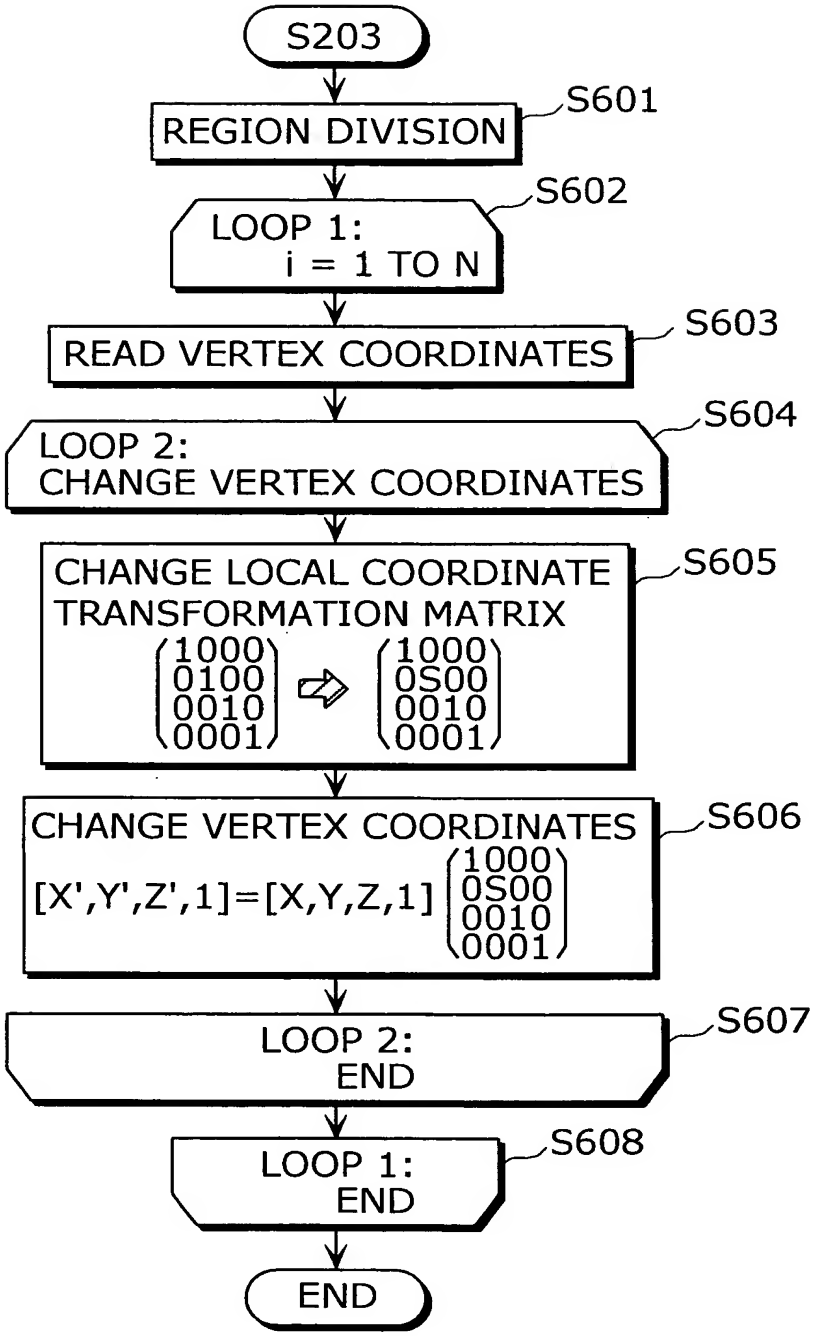

S203
REGION DIVISION
S601
LOOP 1:
i = 1 TO N
S602
READ VERTEX COORDINATES
S603
LOOP 2:
CHANGE VERTEX COORDINATES
S604
CHANGE LOCAL COORDINATE
TRANSFORMATION MATRIX
S605
CHANGE VERTEX COORDINATES
[X',Y',Z',1]=[X,Y,Z,1]
S606
LOOP 2:
END
S607
LOOP 1:
END
S608
END

FIG. 9A

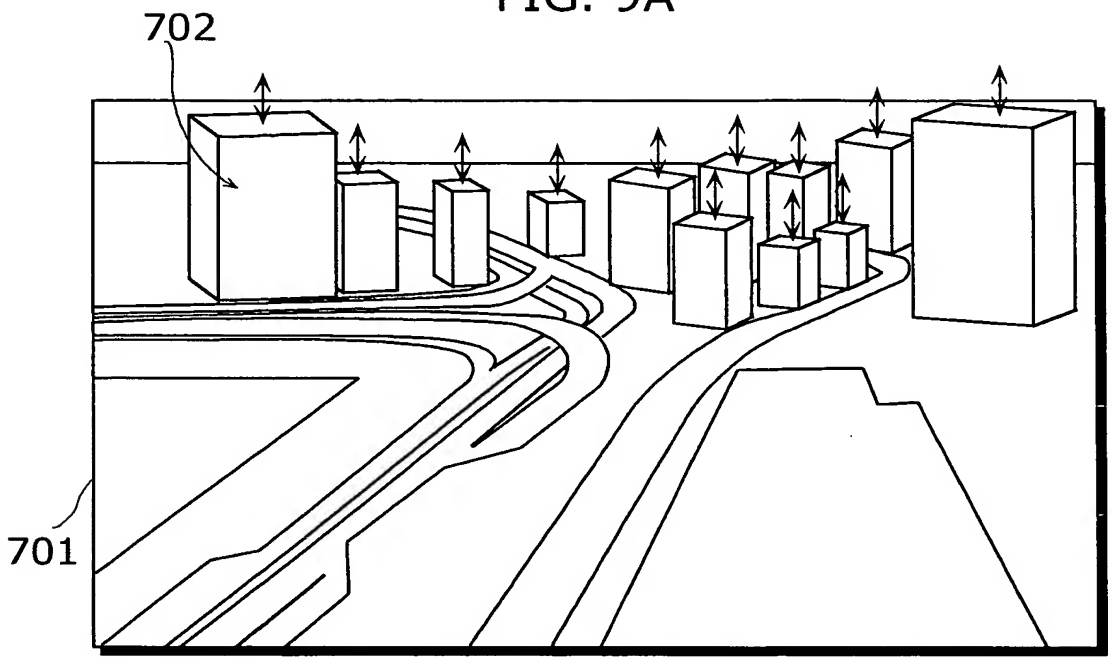


FIG. 9B

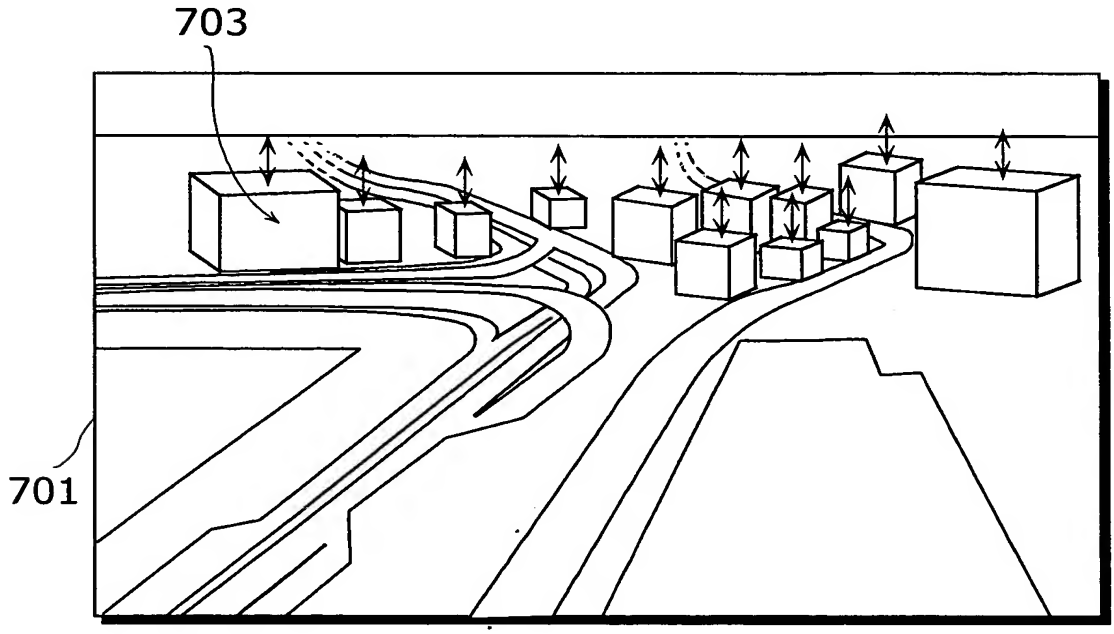


FIG. 10

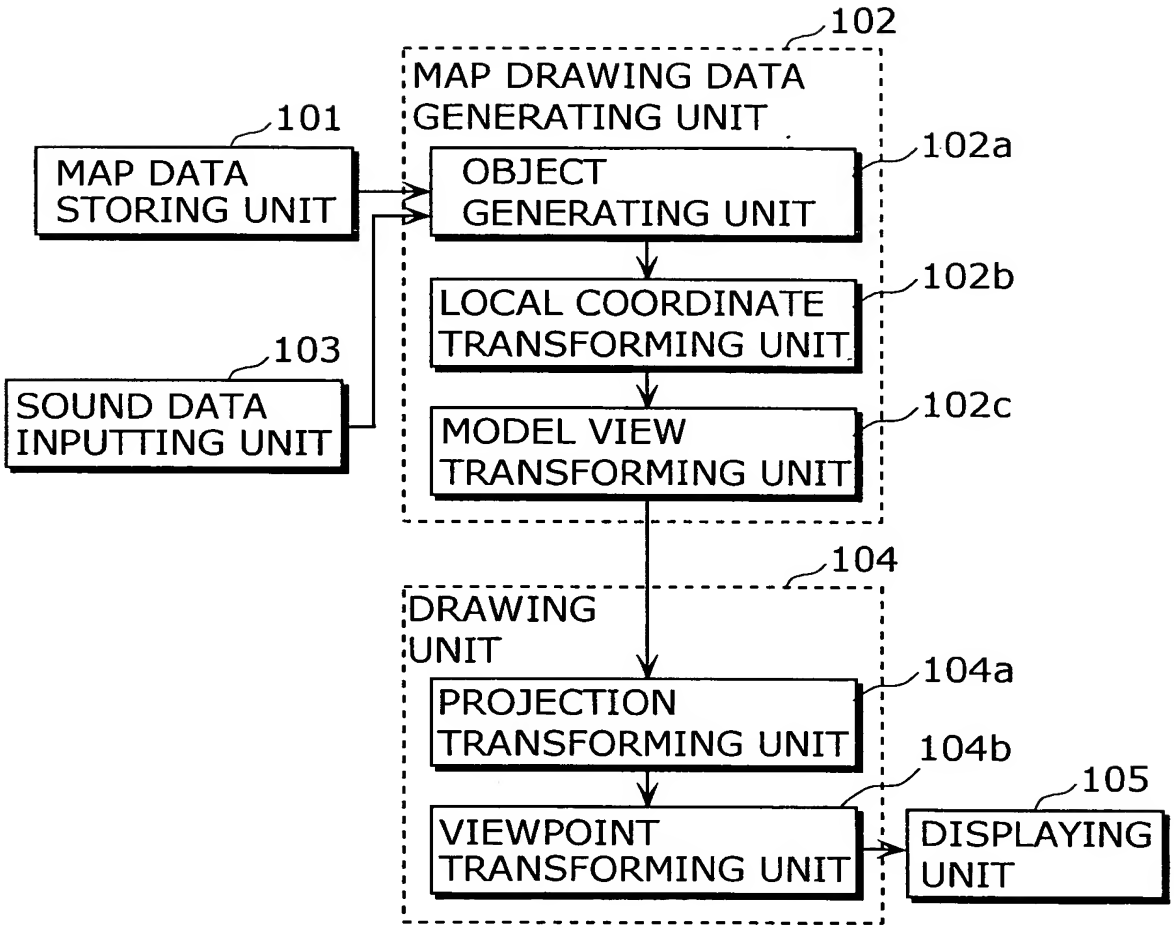

102
MAP DRAWING DATA GENERATING UNIT
101
MAP DATA STORING UNIT
OBJECT GENERATING UNIT
102a
LOCAL COORDINATE TRANSFORMING UNIT
102b
103
SOUND DATA INPUTTING UNIT
MODEL VIEW TRANSFORMING UNIT
102c
104
DRAWING UNIT
PROJECTION TRANSFORMING UNIT
104a
104b
105
VIEWPOINT TRANSFORMING UNIT
DISPLAYING UNIT

FIG. 11

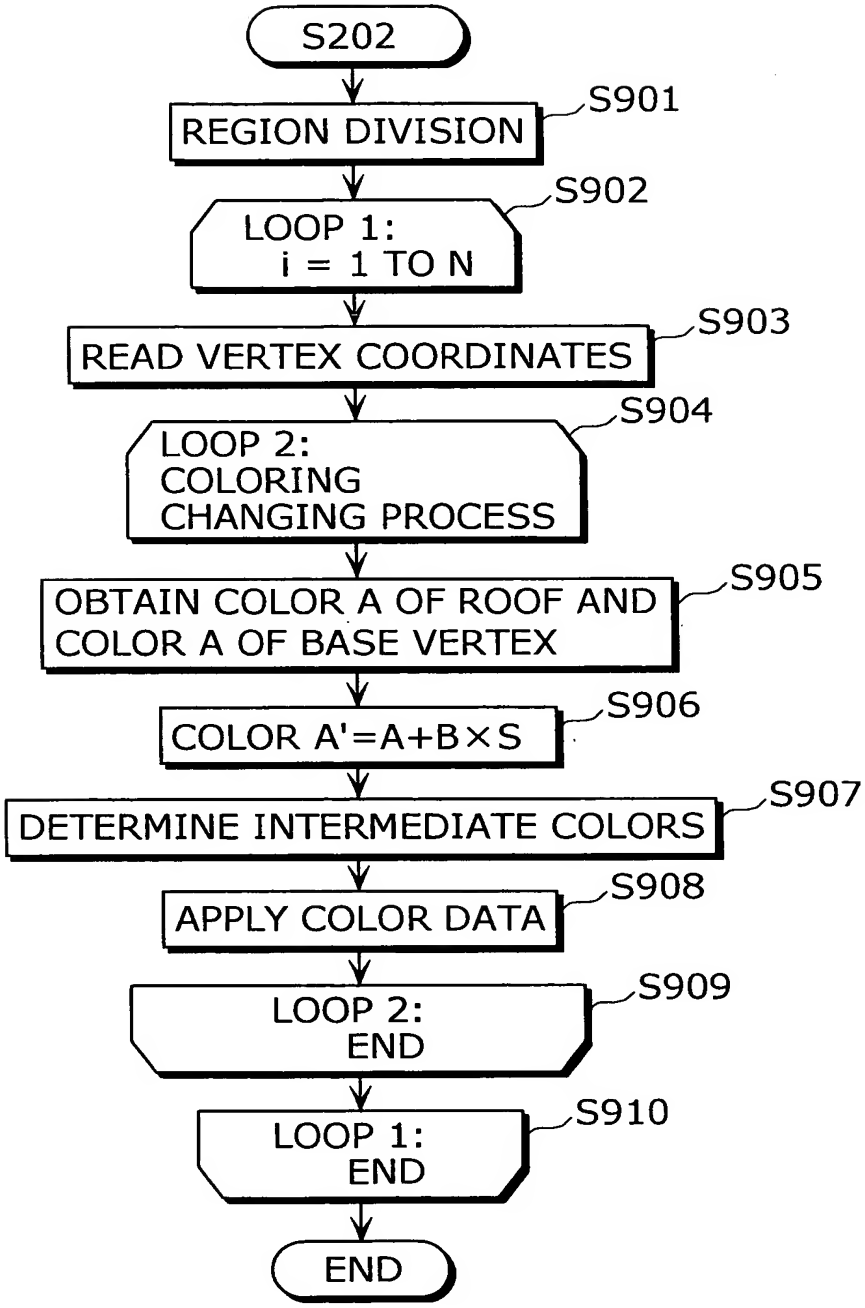

S202
REGION DIVISION
S901
LOOP 1:
i = 1 TO N
S902
READ VERTEX COORDINATES
S903
LOOP 2:
COLORING
CHANGING PROCESS
S904
OBTAIN COLOR A OF ROOF AND
COLOR A OF BASE VERTEX
S905
COLOR A'=A+B×S
S906
DETERMINE INTERMEDIATE COLORS
S907
APPLY COLOR DATA
S908
LOOP 2:
END
S909
LOOP 1:
END
S910
END

FIG. 12A

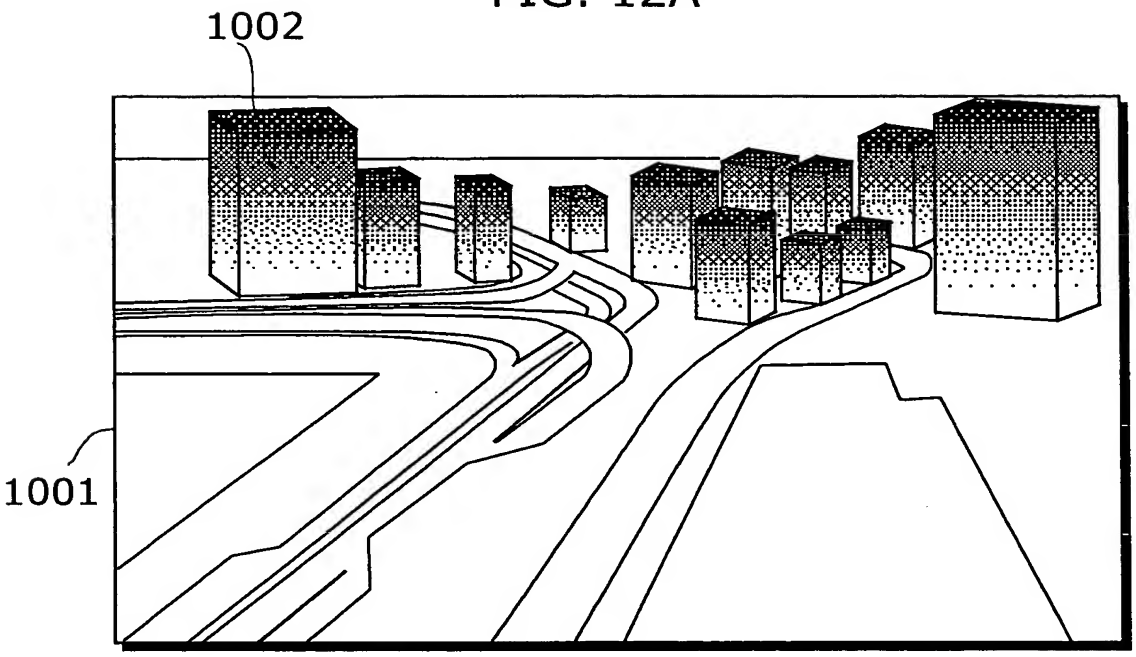


FIG. 12B

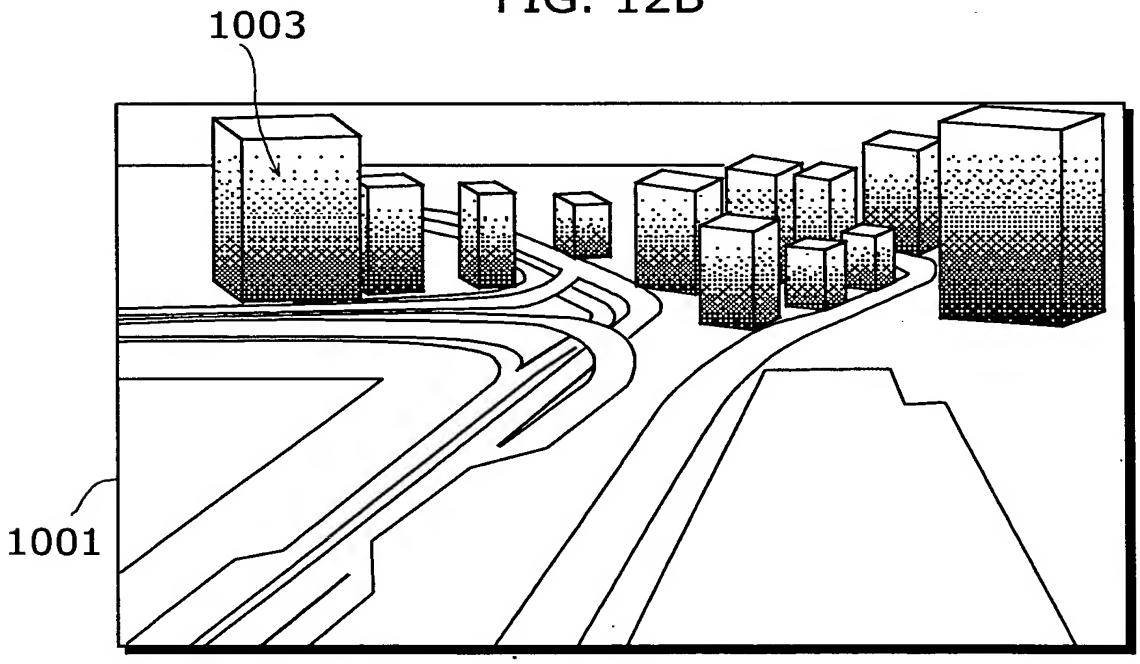


FIG. 13

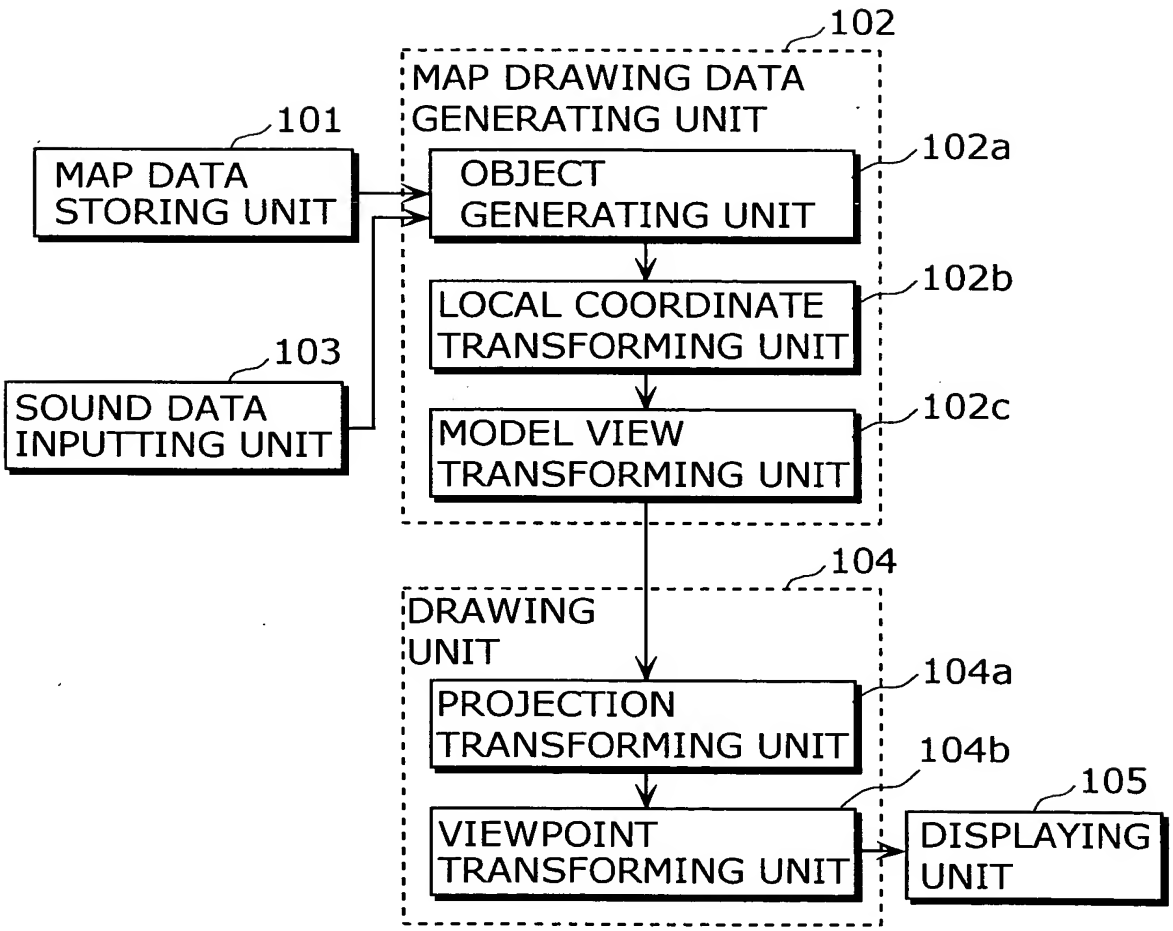

102
MAP DRAWING DATA GENERATING UNIT
101
MAP DATA STORING UNIT
OBJECT GENERATING UNIT
102a
LOCAL COORDINATE TRANSFORMING UNIT
102b
103
SOUND DATA INPUTTING UNIT
MODEL VIEW TRANSFORMING UNIT
102c
104
DRAWING UNIT
PROJECTION TRANSFORMING UNIT
104a
104b
105
VIEWPOINT TRANSFORMING UNIT
DISPLAYING UNIT

FIG. 14

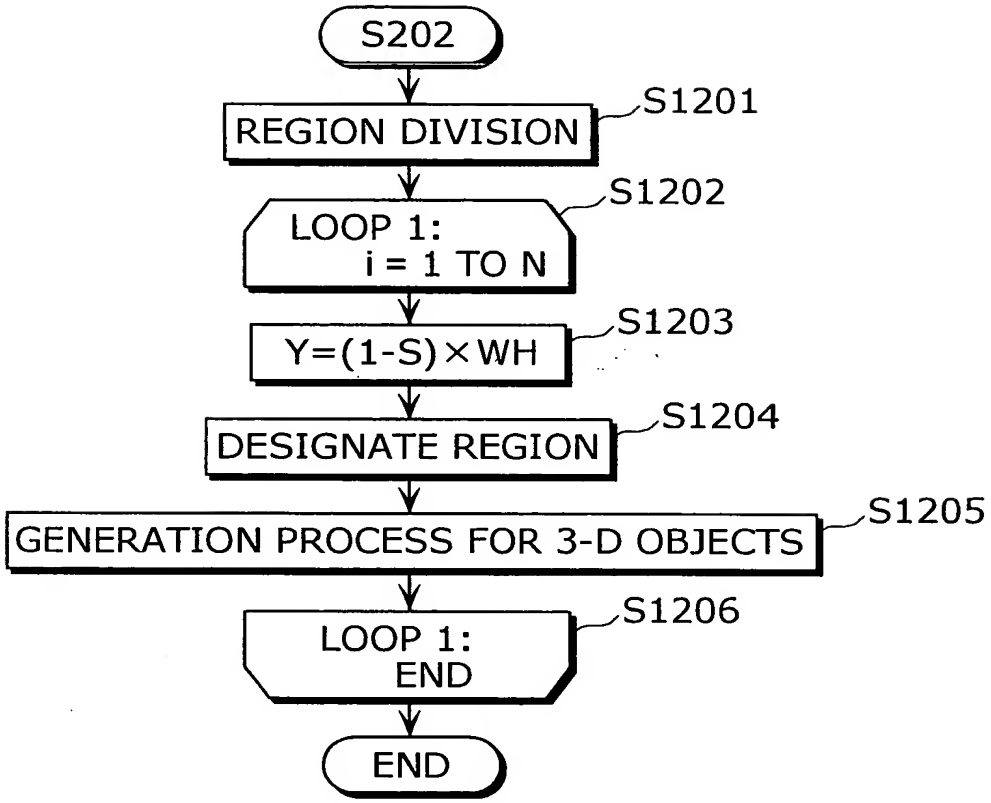

S202
REGION DIVISION
S1201
LOOP 1:
i = 1 TO N
S1202
Y=(1-S)×WH
S1203
DESIGNATE REGION
S1204
GENERATION PROCESS FOR 3-D OBJECTS
S1205
LOOP 1:
END
S1206
END

FIG. 15A

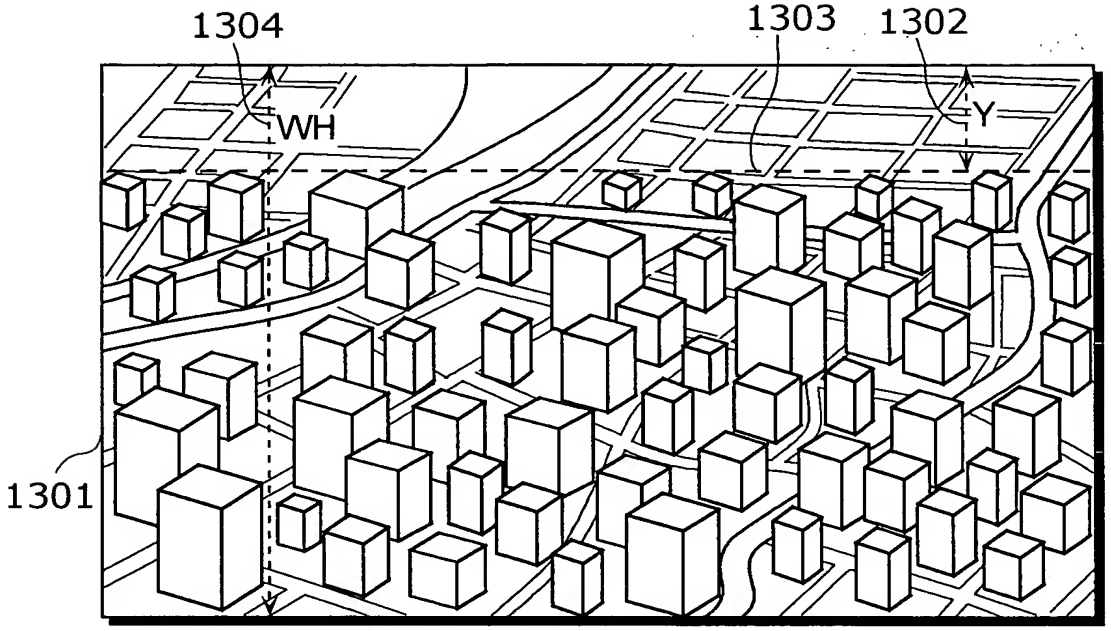


FIG. 15B

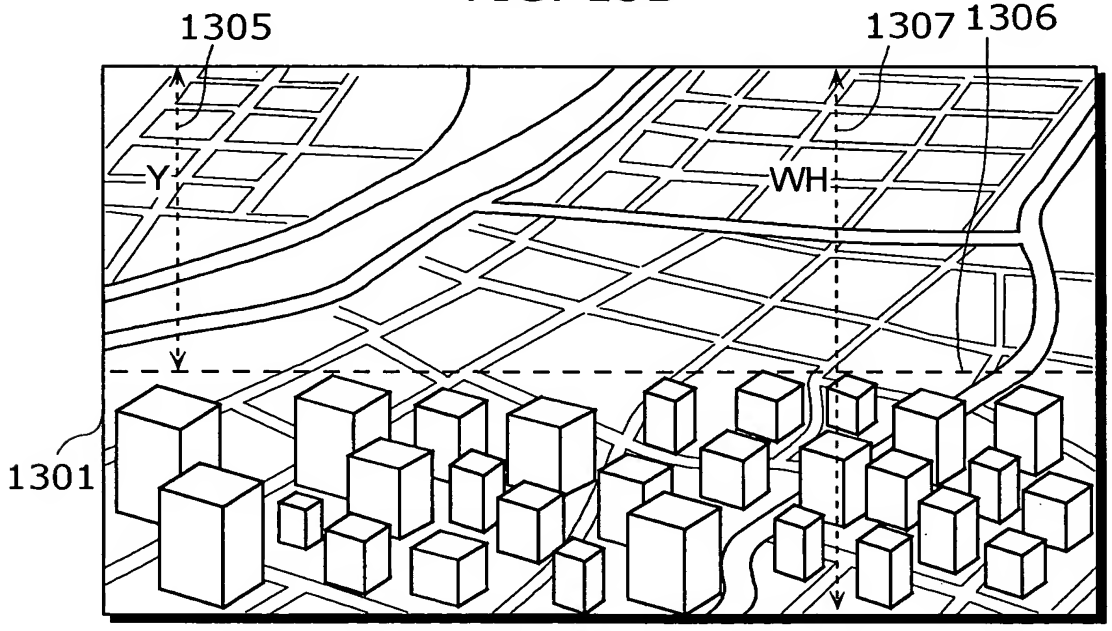


FIG. 16

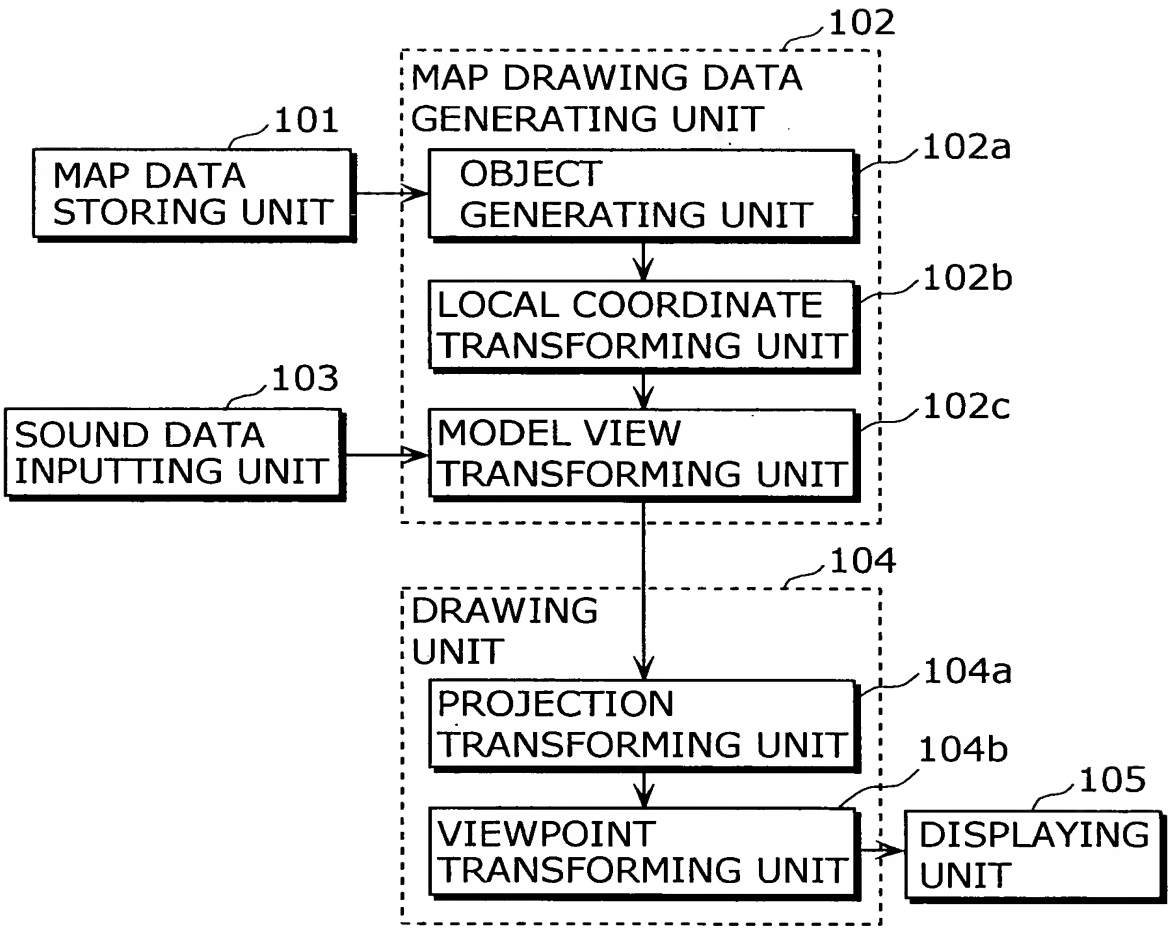

102
MAP DRAWING DATA GENERATING UNIT
101
MAP DATA STORING UNIT
OBJECT GENERATING UNIT
102a
LOCAL COORDINATE TRANSFORMING UNIT
102b
103
SOUND DATA INPUTTING UNIT
MODEL VIEW TRANSFORMING UNIT
102c
104
DRAWING UNIT
PROJECTION TRANSFORMING UNIT
104a
104b
105
VIEWPOINT TRANSFORMING UNIT
DISPLAYING UNIT

FIG. 17

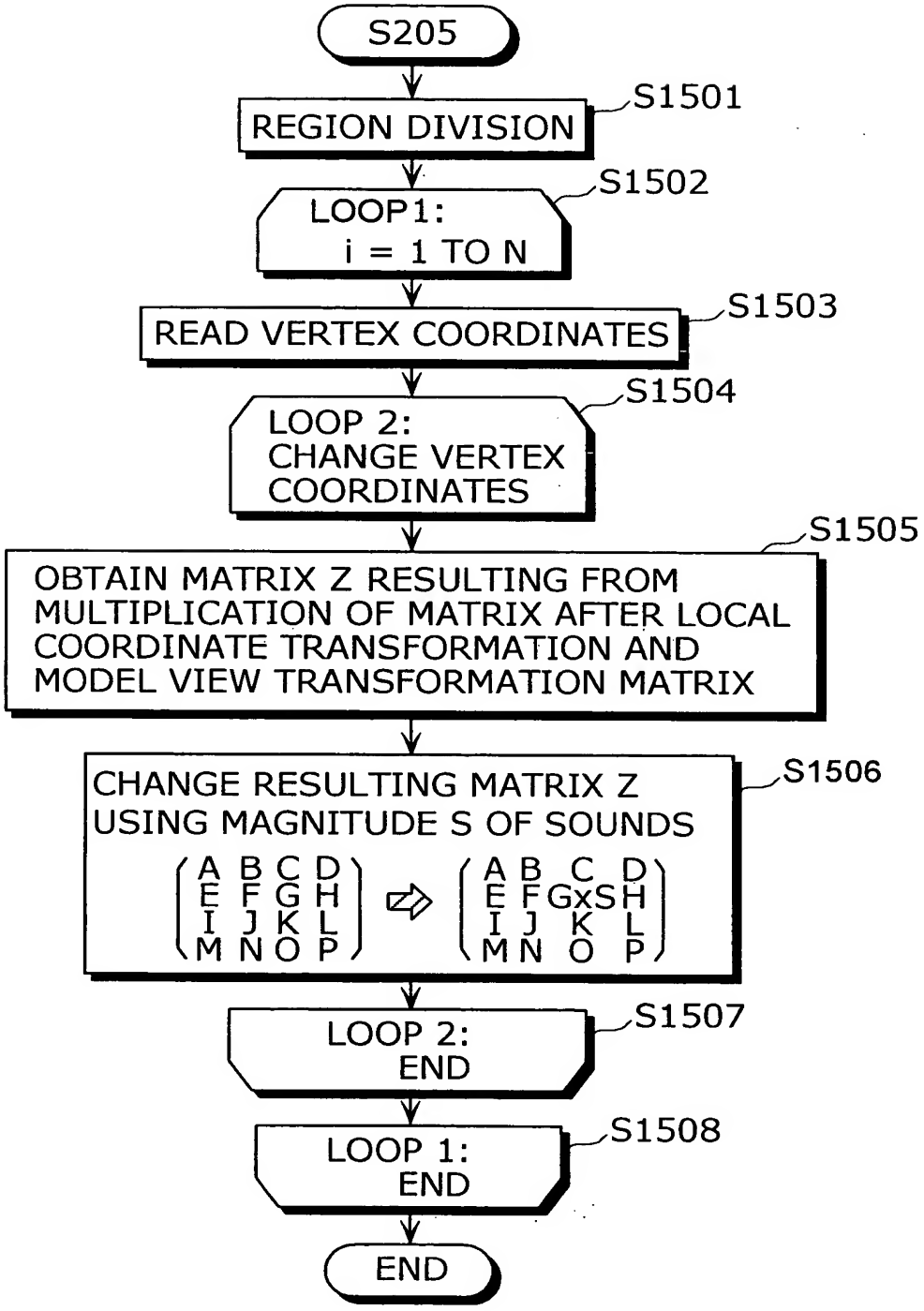

S205
REGION DIVISION
S1501
LOOP1:
i = 1 TO N
S1502
READ VERTEX COORDINATES
S1503
LOOP 2:
CHANGE VERTEX
COORDINATES
S1504
OBTAIN MATRIX Z RESULTING FROM MULTIPLICATION OF MATRIX AFTER LOCAL COORDINATE TRANSFORMATION AND MODEL VIEW TRANSFORMATION MATRIX
S1505
CHANGE RESULTING MATRIX Z USING MAGNITUDE S OF SOUNDS
S1506
LOOP 2:
END
S1507
LOOP 1:
END
S1508
END

FIG. 18A

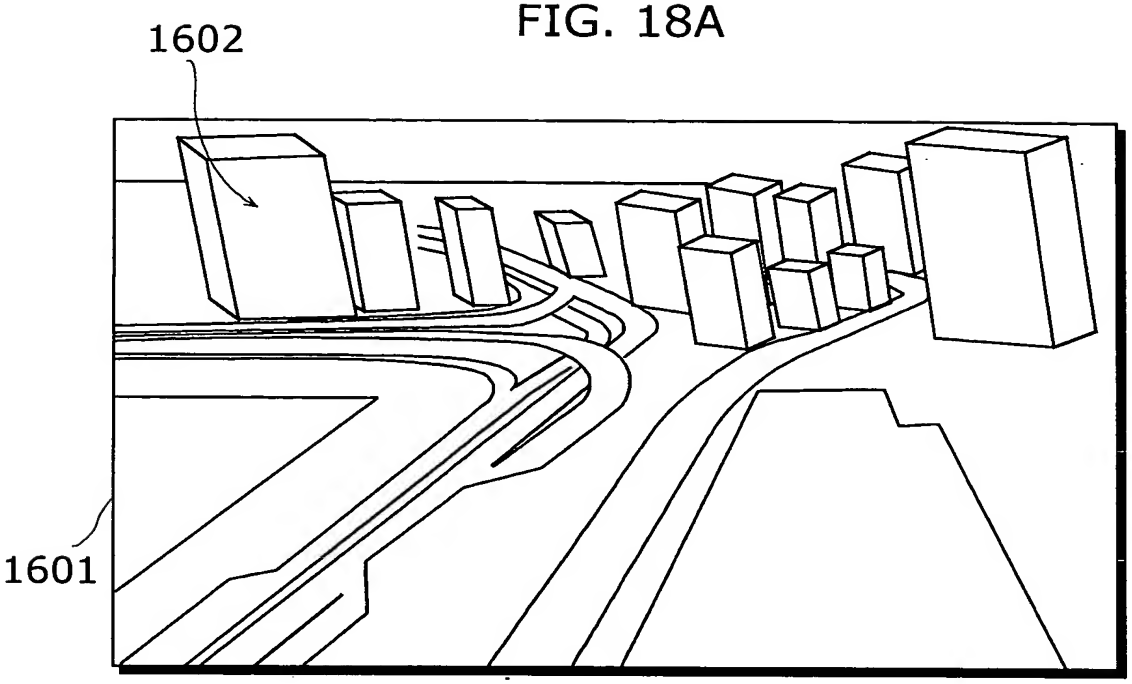


FIG. 18B

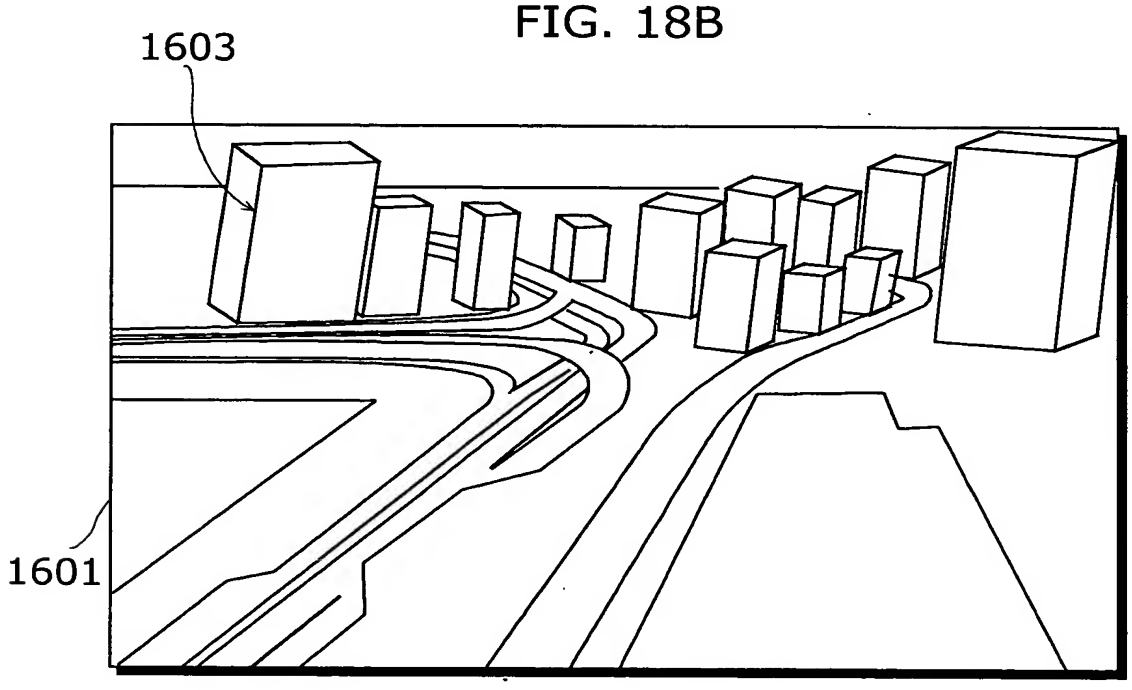


FIG. 19

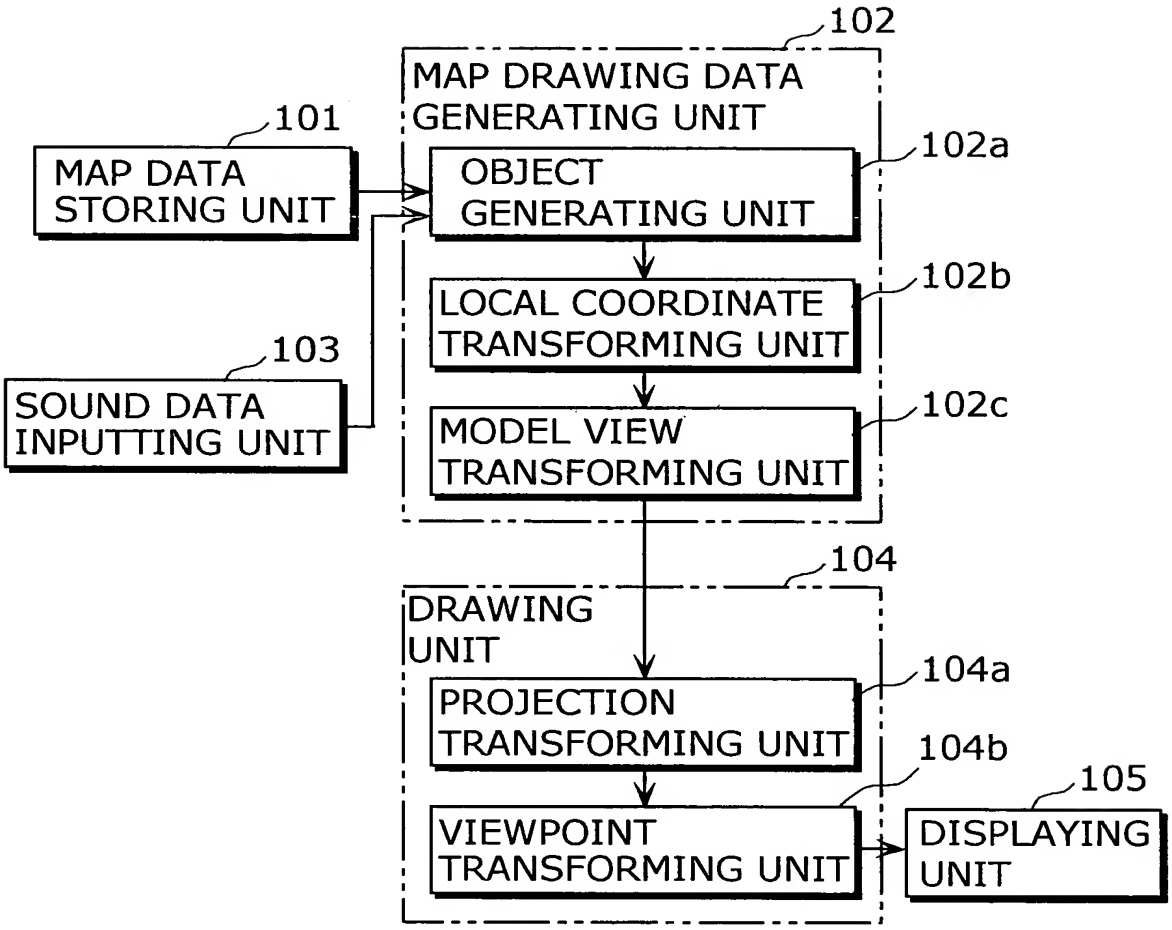

102
MAP DRAWING DATA GENERATING UNIT
101
MAP DATA STORING UNIT
102a
OBJECT GENERATING UNIT
102b
LOCAL COORDINATE TRANSFORMING UNIT
103
SOUND DATA INPUTTING UNIT
102c
MODEL VIEW TRANSFORMING UNIT
104
DRAWING UNIT
104a
PROJECTION TRANSFORMING UNIT
104b
105
VIEWPOINT TRANSFORMING UNIT
DISPLAYING UNIT

FIG. 20

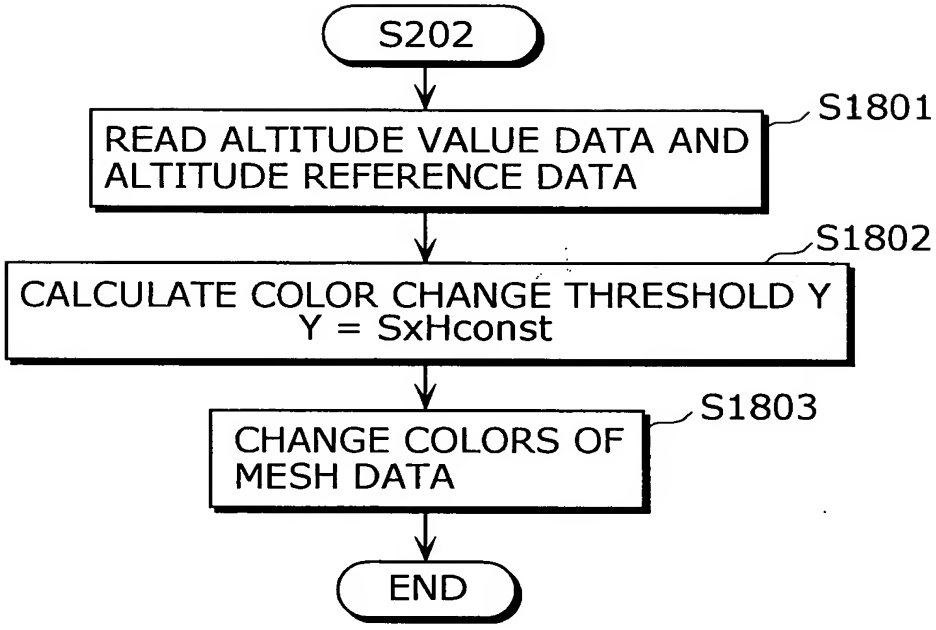

S202
READ ALTITUDE VALUE DATA AND ALTITUDE REFERENCE DATA
S1801
CALCULATE COLOR CHANGE THRESHOLD Y
Y = SxHconst
S1802
CHANGE COLORS OF MESH DATA
S1803
END

FIG. 21A

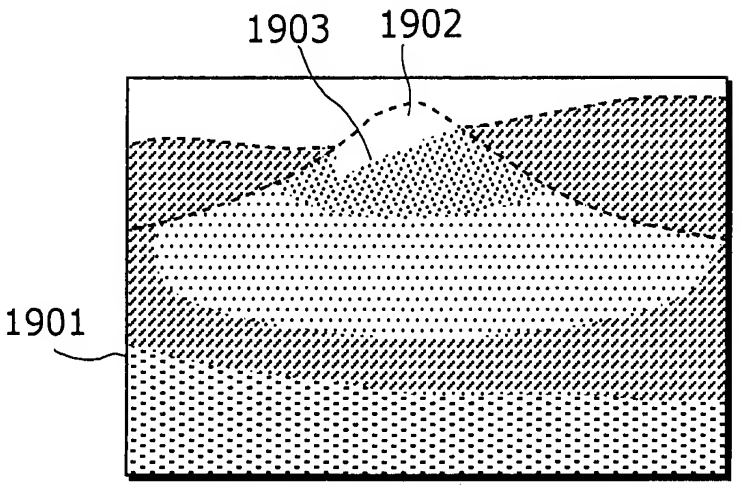


FIG. 21B

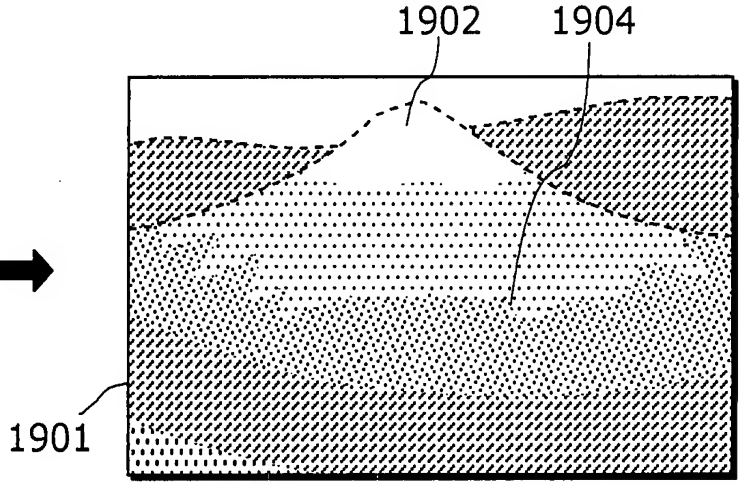
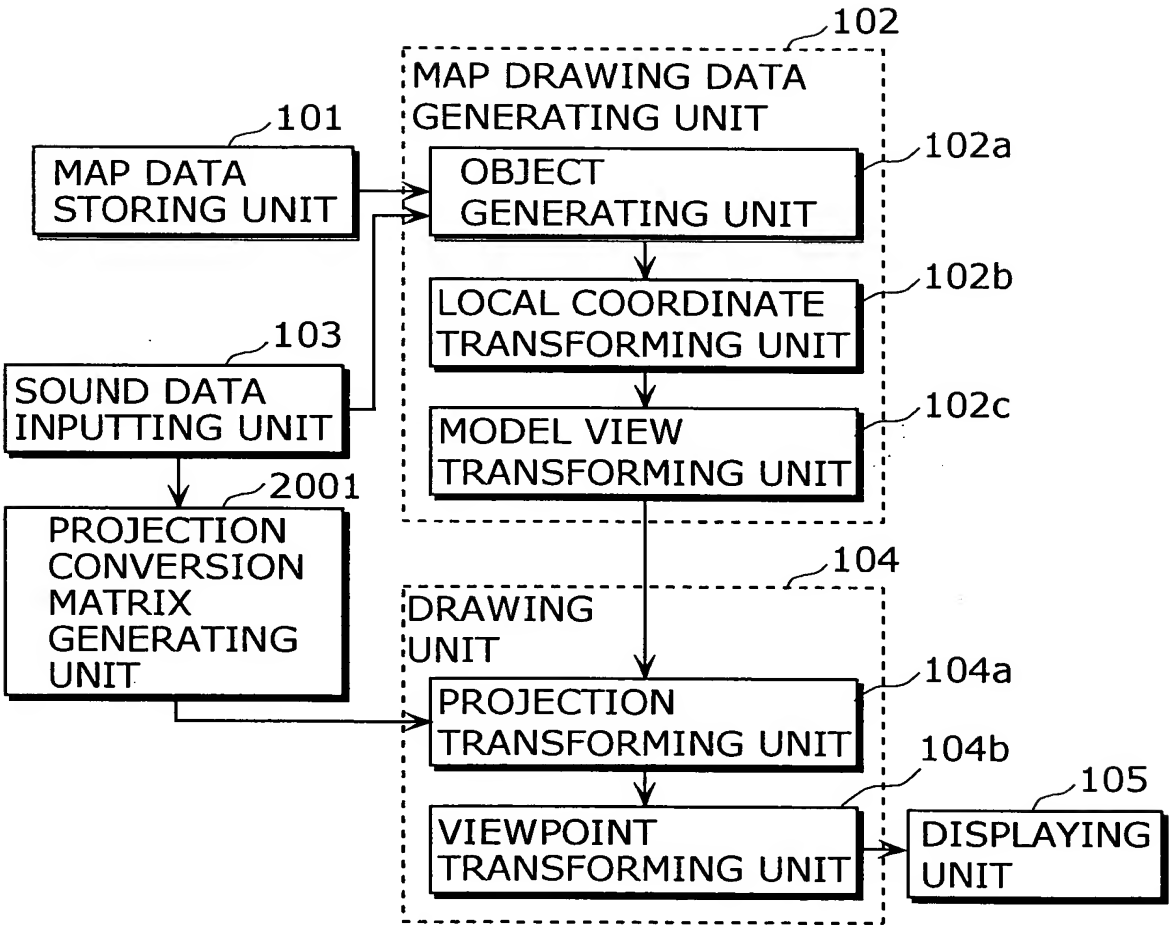


FIG. 22


102
MAP DRAWING DATA GENERATING UNIT
101
MAP DATA STORING UNIT
OBJECT GENERATING UNIT
102a
LOCAL COORDINATE TRANSFORMING UNIT
102b
103
SOUND DATA INPUTTING UNIT
MODEL VIEW TRANSFORMING UNIT
102c
2001
PROJECTION CONVERSION MATRIX GENERATING UNIT
104
DRAWING UNIT
PROJECTION TRANSFORMING UNIT
104a
104b
105
VIEWPOINT TRANSFORMING UNIT
DISPLAYING UNIT